Three Critical Components of Online Learning Resources
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INTRODUCTION

My very first computer was a Commodore 64. We didn't have a monitor to go with the system, so my family just hooked it up to the TV in our kitchen. I sat at that computer and played some sort of spaceship game for hours on end until I finally beat it. After that, I found it kind of boring. The system had word processing capability, but I did not really use the machine for those purposes. It was large, slow, and very clunky.

Technology has advanced so far and so fast since those days in my kitchen. The portable computer advanced rapidly with chip size becoming smaller while memory skyrocketed. Power quickly grew; processing speed lurched into huge dimensions—and none of those shows any signs of slowing. Information gathering has moved beyond the dimensions of the PC into a world-wide virtual network accessible from any LAN drop or Wi-Fi connection. The information of mankind is available at our fingertips, and all at a moment's notice.

The classroom is also changing, trying to take advantage of the technological resources burgeoning around it. Schools once made one or two PC's available in each classroom. They, then, added network drops, followed by campus-wide Wi-Fi connections. Then someone asked the novel question of why learning had to be conducted in the traditional model. All of a sudden, virtual classrooms emerged offering learning experiences to people who never before had success in school.

The online classroom continues to grow. Universities have been using this resource for several years, and public K12 institutions are exploring ways to offer advanced learning

opportunities and self-paced instruction through the online environment. As the online model blossoms, new questions are being asked. What is the best way to conduct an online classroom? What kinds of experiences should be offered to students? How should teachers interact with learners and the material? These questions have yet to be fully answered, but the times are exciting and the opportunity to build lasting contextual environments is promising.

The purpose of this paper is to briefly explore the most important components that should be a part of every online learning experience. The research shows that developing student metacognition, offering regular feedback loops, building schemas for organizing content are the three most important components that should be in every e-learning environment.

FEEDBACK

Children enjoy being encouraged. Teachers are well aware of this. They have learned that, in order to accomplish objectives in their classroom, large amounts of encouragement heaped upon learning minds is important. Whether learning to walk in a line or understanding the meaning of the statistical non-parametric chi square test, students want to know how well they are doing—and they want others to hear about it. This is true for both children and adults. Even the grown-up in a post-graduate class likes to hear they are moving in the right direction. Encouragement is a form of feedback, but it is only one kind of feedback. Others exist.

Pellegrino (2001) says that two laws must always be followed in transferring learning deep into long-term memory. He calls the first of these the power law of practice. This refers to the repetition applied toward a task in order to master its use. For example, a student learning to play guitar will repeat scales over and over again until fret and string location is embedded into memory without the need to look at the guitar. The second law refers to feedback. “Individuals acquire a skill much more rapidly if they receive feedback about the correctness of what they

have done" (Pellegrino et al., 2001, pp. 85-87). Education is famous for sending students home with worksheets to complete without having provided fair amounts of feedback that produce desired results. So when students return home to do the work, they participate in the power law of practice, but do so using incorrect methods and procedures. They learn, but their learning wrong. When it comes time to produce on an assessment or in the real world they will deliver, but incorrectly. Feedback must be timely and informative to achieve the greatest level of effectiveness. It should be given as the instructor provides guided practice and describe not only what is correct, but also what needs improvement. By doing this the instructor promotes the proper application of practice and ensures learning is appropriately embedded into long-term memory.

Since feedback plays such a critical role in the learning process, it cannot be considered a negligible issue in the e-learning environment. It must, instead, be of paramount concern to the course developer and online instructor. As such, feedback should be a part of every online learning resource. The implementation of the practice/feedback loop needs to be carefully considered since direct contact is rarely made between teacher and student. What kinds of practice will teachers ask of students? How can that practice be monitored, and what are the best methods to deliver feedback? Online learning was once thought only to be a means of content delivery. The fact that it can now describe an entire course—content, interaction, and student work product—means the processes of managing feedback must be redefined. Online learning offers a limitless capacity to engage students, but the methods employed should not ignore variables known to exist in the learning process. As teachers and developers continue to wrestle with this delivery mode, the feedback process will become more refined.

Other researchers have recognized the significance of feedback in an online learning environment. Bridge and Appleyard (2008) conducted a study of students' perceptions of feedback using a virtual learning environment. Their study found that most students appreciated the speed, convenience and flexibility offered by online instruction. Few problems were encountered, but some noted a preference for less impersonal feedback mechanisms. The overwhelming support from these students indicates advancement in the feedback process, but more work is yet to be done. For example, this study allowed a six week delay in returning feedback. How might the speed of feedback be increased to the point of immediacy? A question like this must be answered before traditional classroom experiences can effectively be substituted by online methods. Filimban (2008) found that effective online teachers participated actively in their digital classroom by providing relevant and immediate feedback as much as possible. Their use of blogs and forums required a constant presence for feedback to be immediate. As these tools receive further exploration, one must ask if other undeveloped tools might exist to increase the speed of feedback and allow the teacher to utilize a more efficient use of time. Current online teachers recognize the importance of timely feedback and make a way to embed this into their teaching practices.

METACOGNITION

I have a friend who has only a handful of undergraduate course hours. He is near forty years old and has tried multiple times to return to school and finish this degree. Life continually gets in the way of his academic advancement. He happens to be, however, one of the smartest people I've ever met. He is extremely well-read, seems to remember everything he reads, and has a natural ability to argue and defend a point. While I work on a doctoral degree, he seems to soar past me in his own learning, quickly absorbing whatever his eyes see. This friend may have

a higher intelligence quotient than my own—we've never compared—but I believe it is more likely he has firmly landed within his learning zone. In education this is referred to as metacognition.

Metacognition is thinking about ones own thinking. It is comprised of two major components: knowledge of self, and regulation of the learning process (Kim, 2005). Pellegrino says that "it is used to refer to the selection and monitoring processes, as well as to more general activities of reflecting on and directing one's own thinking". My friend is a very successful learner because he has thought through how he learns best and consistently exposes his mind to those environments. He has become his own metacognitive expert. Pellegrino goes on to say "this capability for self-regulation and self-instruction enables advanced learners to profit a great deal from work and practice by themselves and in groups." While my friend may not represent the norm, he illustrates the power metacognition holds in the learning process.

In structuring online learning environments, teachers should consider the impact of metacognition and create ways to harness its power, especially in domain-specific areas. It is "crucial to effective thinking and problem-solving and is one of the hallmarks of expertise to specific areas of knowledge and skill". Applying a strong understanding metacognitive development into the online environment ensures students build a progressively stronger base of the learning zone. So, how might a teacher create environments that promote a student's thinking about their own thinking? Pellegrino points out that skills based in metacognition can be taught. Instructors who build experiences where mental devices are employed, create avenues to monitor progress, and encourage reflection on strengths and weakness will facilitate metacognitive moments.

Metacognition is a subject addressed by more than Pellegrino. Azevedo (2005) makes a strong statement about the significance of metacognition in online learning. He says, "the effectiveness of [online learning environments] will only be achieved if learners regulate their learning—that is, if they deploy the metacognitive and self-regulatory processes necessary to effectively learn about the relevant topics" (p. 193). Thus a learning environment absent of metacognition is not a learning environment at all—it is merely an empty shell of informational content. This is true for traditional classrooms along with online learning environments. As instruction continues to adjust toward an e-learning context, however, the absence of direct teacher-student interaction necessitates a more purposeful examination of metacognitive implementation measures. Kim (2005) says that reflective learning does not happen by itself. Learners must not only learn the material, they must learn about themselves, how they think, and the methods by which they process. This further supports the idea that online instructors must carefully consider the tools they will use to aid students in the metacognitive process.

Research continually supports the significance of metacognition. It holds a critical function in the long-term learning process. Since reflective learning is central to all long-term learning it should be included in every lesson plan and resource constructed by teachers whether online or in a traditional setting.

SCHEMAS FOR ORGANIZING CONTENT

Infants must learn to make sense of complex pieces of information. They don't yet understand the stern look of an adult or the snarl of a dog. The smile of a mother, or the giggle of another child do not create automatic reactions in a newborn child. However, after only a few short weeks of life, the smiling face of daddy will illicit a grin from baby. The scowling look from mommy will cause baby to burst into tears. How did the child learn to do this? She has no

concept of language by which to learn new material, but she seems to have instinctively gained the ability to mirror the expression of a loved one. A baby's use of schemas provides an answer to this question.

Schemas are techniques used "for organizing knowledge in memory in ways that are useful for solving problems" (Pellegrino et al., 2001, p. 70). In the previous example, the baby has a problem: how should facial expressions be interpreted? The scowl presents feelings of sadness and fear while the grin produces peace and joy. Unconsciously, the child creates a schema for the scowl by encoding the fear and sadness into memory. When the scowl is presented again, the schema reminds the child of the emotions and produces a burst of tears. The same process is used for the grin. By employing schemas, infants are able to make sense of the world around them and learn to operate functionally within it. This process continues throughout the life of the child into adulthood so that learning constantly takes place: from rational, objective learning experiences to irrational, abstract concepts.

Schemas offer a critical process in making sense of new material. They allow the learner to understand something new based on previous knowledge. Pellegrino (2001) says that schemas "enable competent performers to recognize situations as instances of problems they already know how to solve" (p. 70). This recognition enables the learner to apply already known problem solving techniques to an unfamiliar problem, thus avoiding inefficient trial-and-error procedures. So when a student reads a book, or solves a math problem, or examines an abstract concept, they do so through the lenses of the schemas they have already developed. Once this new information has been learned and transferred into long-term memory, it constitutes a redefinition of the schema and is available for use as additional learning is encountered.

Since online learning involves a divergence from the traditional classroom experience, schemas are all the more important in facilitating the acquisition of knowledge. In the face-to-face classroom, teachers are able to use the non-verbal cues of students to ascertain learning. For example, students that have a confused look on their face are likely to be struggling to understand the material, indicating they have not encountered situations that have created the necessary schemas. This is not readily apparent to the teacher of the online classroom. Since the teacher cannot physically interact with the student, they are unable to catch non-verbal cues and help the student through learning experiences. This, then, requires the student to become self-reflective in evaluating their own learning. They need to know the definition of a schema and be able to recognize their appropriate application. In order for online learning to truly be effective, students will need to learn to monitor their own thinking in regard to schemas; and teachers must learn to guide students through this process. Neglecting the use of schemas assumes that online learning is simply the transference of information rather than the opportunity to interact and wrestle with new knowledge, thus implanting it deep into the recesses of long-term memory.

Online learning has developed a unique niche relative to schemas. Sontag (2007) points out that people engaged in the digital revolution have developed new structures termed social and cognitive-connectedness schemata. These frameworks take into account previously unexplored styles of learning and are applied into the world of online learning. These new systems enable teachers to operate effectively within the web structure. Retalis (2006) comments that the very design and structure of the software used to implement a web-based learning environment should take into consideration the pedagogy and schematic structures implicit in the subject matter. Therefore, if appropriate systems are to be utilized in the e-learning environment, both designers and educators must be aware of the role schematic

frameworks play in learning new material. A cohesive approach between designer and teacher will ensure the ongoing advancement of learning into undeveloped and emerging technologies.

CONCLUSION

Metacognition, feedback and schemas for organizing content are three lesson components that should be included in every online resource. Metacognition has been shown to be a critical function of the learning process. Feedback enables students to continually practice proper techniques burying new learning into long-term memory. Schematic frameworks organize the content of previous learning which can then be presented in moments where new material is encountered. When combined these three tools create such powerful learning moments. In an age where material to be learned is so vast and inexhaustible the power factor of these components must certainly be harnessed. If true learning is the implantation of material into long-term memory then feedback loops facilitate this process. If real learning is the ability to self-regulate, learn how information is best digested, and become a life-long learner, then metacognition offers the best solution. If the strongest learner is one who is able to view every problem through a series of smaller, predefined, compartmentalized problems, then schemas for organizing content will produce the strongest learner.

Real learning is likely a combination of each of these factors. Therefore, a combination approach is the best solution in meeting these learning needs. Teachers who incorporate these components into every lesson are certain to engage their students regularly, and draw out from them the absolute best. The absolute best is needed in every classroom—traditional or online—to ensure deep learning opportunities are provided to every student, every day.

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